

REMARKS

Claims 105-141 have been canceled and claims 142-193 have been added.

Objection to claim 137

The examiner objected to claim 137 as in improper dependent form. Claim 137 has been canceled.

Double Patenting

The examiner contended that claims 105-141 conflicted with the claims to monomers allowed in U.S. Application No. 10/056,121. Claims 105-141 have been canceled and new claims 142-193 have been added. Applicant notes that U.S. Patent Applicant No. 10/056,121 has not yet issued. Applicant respectfully requests that the double patenting rejection be withdrawn with respect to new claims 104-193 for the following reasons.

The present application was filed on the same day as U.S. Patent Application Serial No. 10/056,121. Therefore, U.S. Patent Application Serial No. 10/056,121 should not be cited as a reference against the present application. The applications were filed separately in order to obtain claims to the mesogens (in 10/056,121), and to obtain claims to novel methods for making the mesogens (in the present case). A separate application was necessary because "the product as claimed [in U.S. Applicant No. 10/056,121] can be made by another materially different process." MPEP 806.05(f).

As explained in the specification, in certain known methods (“Scheme 1”), the polymerizable group(s) are reacted with the “first” and “second” phenylene ring(s) before the “first” and “second” phenylene ring(s) are reacted with the “third” phenylene ring (typically, a hydroquinone molecule). The claimed method produces platform molecules comprising either hydroxyl groups (claim 149), amino groups, sulfhydryl groups, or halogen atoms (claim 186) or

terminal groups comprising other than polymerizable groups, one or more of said terminal groups being selected from the group consisting of $\text{HO}-(\text{CH}_2)_n\text{-O-}$ groups, $\text{Cl}(\text{CH}_2)_n\text{-O-}$ groups, $\text{Br}(\text{CH}_2)_n\text{-O-}$ groups, $\text{I}(\text{CH}_2)_n\text{-O-}$, and reactive derivatives thereof, wherein n is from about 2 to about 12 and CH_2 independently is selected from the group consisting of CH_2 which is unsubstituted and CH_2 which is substituted by an element selected from the group consisting of oxygen, sulfur, and an ester group; provided that at least 2 carbon atoms separate said oxygen or said ester group.

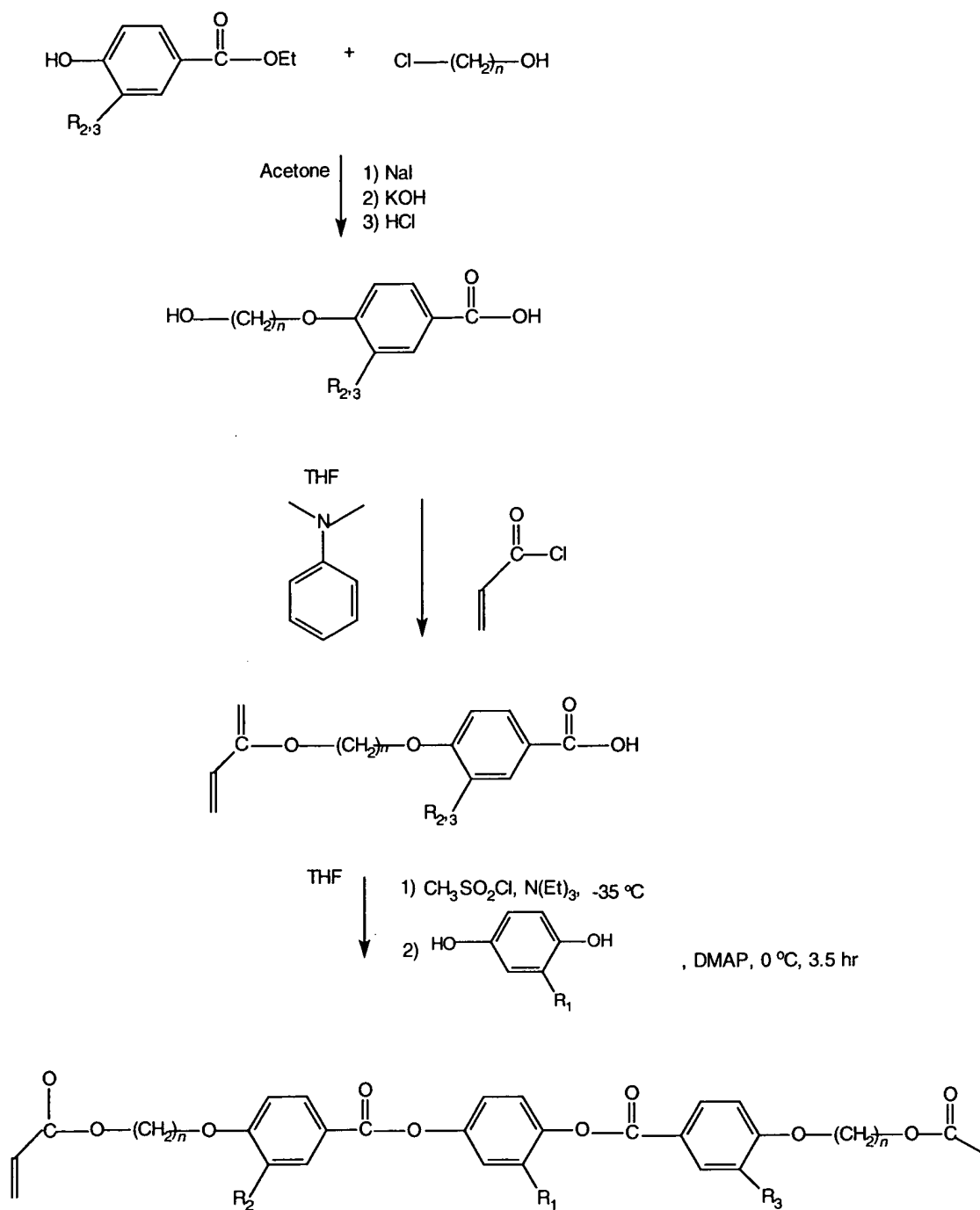
(Claim 142).

Applicant submits that the foregoing explanation is made as a convenience to assist the examiner, and not to overcome a prior art reference. U.S. Patent Application Serial No. 10/056,121 is not a prior art reference.

In this regard, Applicant also directs the examiner’s attention to the specification, which explains that “[t]he mesogens may be made using any suitable method.”

Specification, p. 9, l. 10:

In the past, polymerizable mesogens having the foregoing structure were synthesized by a multistep process (“Scheme 1”), as shown below:



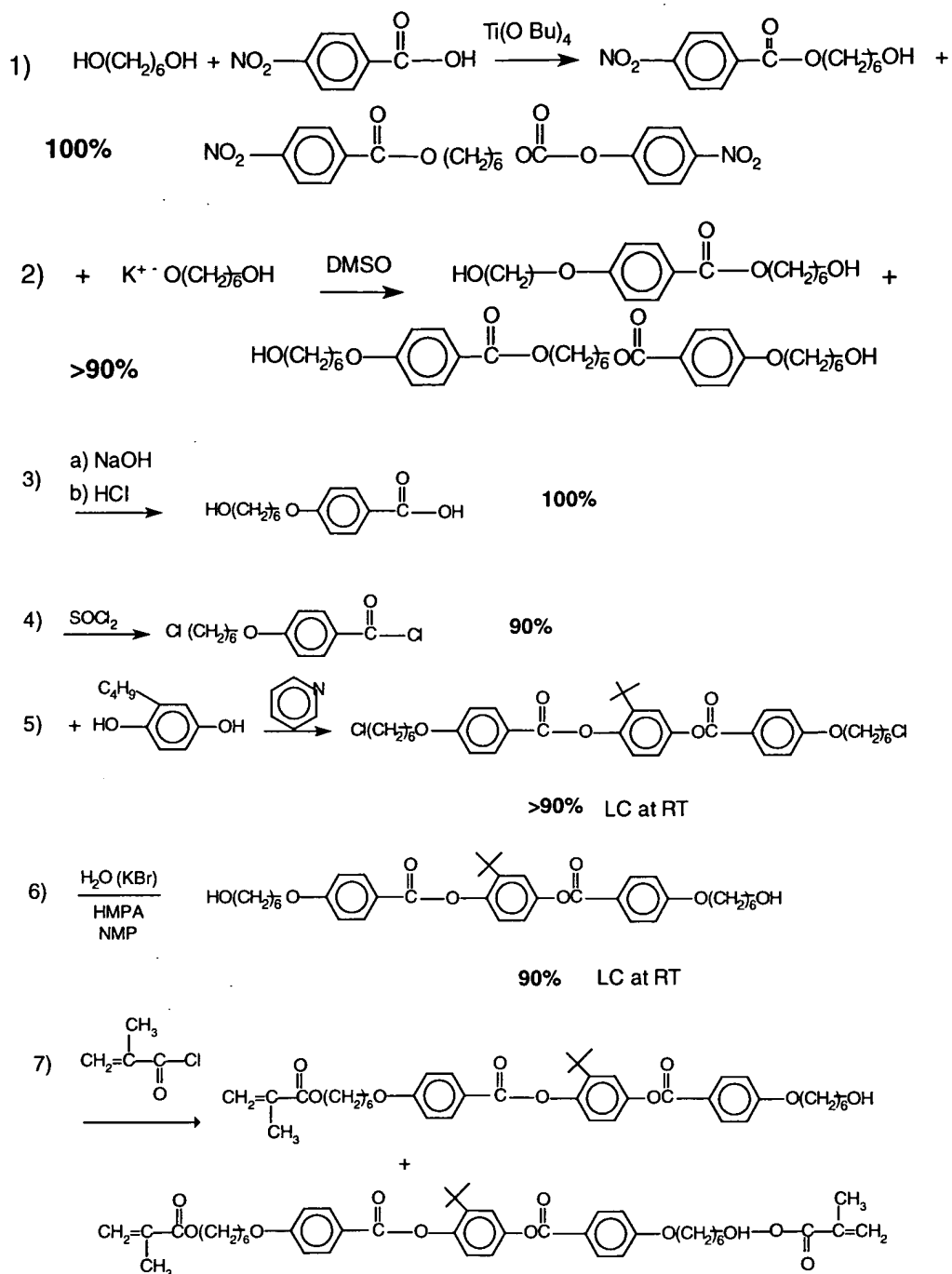
Scheme 1.

In Scheme 1, molecular ends containing the outer aromatic groups and the alkyl groups were produced first and then coupled to the central aromatic group by diaryl ester bonds.

The application explains that

Platform molecules also may be made using synthetic pathways that use relatively low cost materials to synthesize a central aromatic component comprising end groups that are easily reacted with the desired polymerizable groups. The methods, herein called "Scheme 2," are quantitative, produce high yields, the products are easily purified (preferably by crystallization), and many of the products are more stable than bisalkenes, which must be stabilized against polymerization.

In a first embodiment (Scheme 2), the molecular ends of the mesogen (outer aromatic and alkyl groups) are prepared and coupled to the central aromatic group by diaryl ester bonds. This synthetic pathway is illustrated and described in detail below:



Scheme 2.

Exemplary “platform molecules” include, but are not necessarily limited to the molecule illustrated in (6), above.

(Emphasis added). The “platform molecules” such as (6) do not comprise polymerizable end groups.

In response to Applicant’s argument that the claims to the method of making the mesogens should be examined separately from the claims to the mesogens, the examiner argues that “every invention of a device or composition provides for the provision of said device or composition if the provision of such lacks any further steps in the process or method.” Final action, p. 3. The currently pending claims do contain “further steps in the process or method” which the examiner has not pointed to in the cited references, as discussed more fully below. Applicant does not believe it is necessary to provide a full discussion of *Ex parte Deuel* in order to establish this point. *Id.*, 33 U.S.P.Q.2d 1445, 1448 (B.P.A.I. 1993), *reversed* 51 F.3d 1552, 34 U.S.P.Q.2d 1210 (Fed. Cir. 1995). Applicant does point out that *Ex parte Deuel* relates to recombinant DNA technology, and not to liquid crystal monomers.

Applicant respectfully requests withdrawal of the double patenting rejection with respect to claims 142-193.

Anticipation Rejections

Seiberle

The examiner rejected claims 105-141 under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,649,230 to Seiberle, et al. (“Seiberle”).

Claims 142-148 and 159-166

The examiner has not pointed to a teaching in Seiberle of a method that produces platform molecules comprising (a) hydroxyalkoxy groups (claim 149), (b)

terminal groups comprising other than polymerizable groups, one or more of said terminal groups being selected from the group consisting of HO-(CH₂)_n-O- groups, Cl(CH₂)_n-O- groups, Br(CH₂)_n-O- groups, I(CH₂)_n-O-, and reactive derivatives thereof, wherein n is from about 2 to about 12 and CH₂ independently is selected from the group consisting of CH₂ which is unsubstituted and CH₂ which is substituted by an element selected from the group consisting of oxygen, sulfur, and an ester group; provided that at least 2 carbon atoms separate said oxygen or said ester group.

(Claim 142), or (c) terminal groups other than polymerizable groups and being selected from the group consisting of amino groups, sulfhydryl groups, and halogen atoms (Claim 186).

If Applicant reads Seiberle correctly--the examiner also cannot point to a teaching or suggestion in Seiberle of the limitation of independent claims 142 and 186 (and claims depending therefrom) of “forming a mixture comprising said first phenylene rings [A], said second phenylene rings [B], and said third phenylene rings [C].” (A+B+C).

Rather than teaching the claimed A+B+C, Seiberle appears to teach

$$A+B=1$$

$$\text{and } 1+C=2.$$

In other words, at least Example 1 of Seiberle describes a process of producing a first product (1) by forming a first mixture of (A) a first phenylene ring, and (B) a second phenylene ring. Then, the first product (1) is mixed with the third phenylene ring (C) to form a final product (2). The following is an attempt to annotate the foregoing argument.

- (1) Mixing a first phenylene ring with a second phenylene ring to produce a first reaction product:

(A) "2,5-dihydroxybenzoic acid 11-(2-methylacryloyloxy ester"	Seiberle, col. 25, ll. 1-15.
+	
(B) "(E)4carboxycinnamic acid methyl ester"	
= First Reaction Product: "(E)- 2-hydroxy-5-[4-(2-methoxycarbonylvinyl)benzoyloxy]benzoic acid 11-(2-methylacryloyloxy)undecyl ester"	

- (2) Mixing the first reaction product with a third phenylene ring to produce a final product:

First Reaction Product: "(E)- 2-hydroxy-5-[4-(2-methoxycarbonylvinyl)benzoyloxy]benzoic acid 11-(2-methylacryloyloxy)undecyl ester"	Seiberle, col. 25, ll. 23-67.
+	
(C) "4-propylbenzoic acid"	
=Final product: "(E)-5-[4-(2-methoxycarbonylvinyl)benzoyloxy]-2-(4-propylbenzoyloxy)benzoic acid 11-(2-methylacryloyloxy)undecyl ester"	

The examiner has not pointed to a teaching in Seiberle to produce the product by forming a mixture of all three components in a single mixture (A+B+C) to produce the final product. For all of the reasons given above, the examiner therefore has not pointed to a teaching or suggestion in Seiberle of every element of the pending claims.

The examiner did not issue an alternate obviousness rejection over Seiberle. In anticipation of any such rejection, Applicant submits the following. In order to establish

a case of *prima facie* obviousness over Seiberle, the examiner must point to two things in the prior art, and not in the applicant's disclosure--(1) the suggestion of the invention, and (2) the expectation of its success. *In re Vaeck*, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). See also MPEP 2143. The examiner has not met this burden.

The examiner has not pointed to a teaching or suggestion in Seiberle of the features discussed above. Nor has the examiner pointed to a teaching or suggestion in the **references themselves** that it would be desirable to make the modifications required to result in the claimed method. MPEP 2143.01; *In re Brouwer*, 37 U.S.P.Q.2d 1663, 1666 (Fed. Cir. 1995).

Applicant respectfully requests that the pending claims be allowed over Seiberle.

Claims 149-184 (and dependent claims)

The examiner has not established a case of *prima facie* anticipation of claims 149-184 (and dependent claims) over Seiberle for the additional reason that the examiner has not pointed to a teaching in Seiberle to prepare the first and/or the second phenylene ring by

reacting 4-nitrobenzoic acid with a 1, n-dihydroxyalkane comprising an alkylene group having from about 2 to about 12 carbon atoms in the presence of an esterification catalyst under esterification conditions effective to produce a hydroxyalkyl ester of 4-nitrobenzoic acid;

treating the hydroxyalkyl ester of 4-nitrobenzoic acid under cleaving conditions effective to produce 4-(n-hydroxyalkoxy)benzoic acid, wherein n is the number of carbon atoms in said alkylene group;

providing said 4-(n-hydroxyalkoxy)benzoic acid as one or more of a phenylene ring selected from the group consisting of a first phenylene ring comprising a first carboxylic group and a second phenylene ring comprising a second carboxylic group.

According to Applicant's interpretation, the preparation of the monomers is described in Seiberle's Examples. In example 1, Seiberle's preparation of 4-carboxyl cinnamic acid methyl ester appears to roughly correspond to the preparation of one of the "first" or the "second phenylene ring" Seiberle reacts "4-carboxybenzaldehyde" with "[methoxycarbonyl] methyl]triphenyl phosphorane," as shown at Seiberle col. 23, ll. 20-37. The "second phenylene ring" appears to correspond roughly to Seiberle's "4-propylbenzoic acid", the preparation of which is not described. Seiberle, col. 25, ll. 1-16 (emphasis added).

The examiner has not pointed to a teaching in Seiberle to

react[] 4-nitrobenzoic acid with a 1, n-dihydroxyalkane comprising an alkylene group having from about 2 to about 12 carbon atoms in the presence of an esterification catalyst under esterification conditions effective to produce a hydroxyalkyl ester of 4-nitrobenzoic acid;

treat[] the hydroxyalkyl ester of 4-nitrobenzoic acid under cleaving conditions effective to produce 4-(n-hydroxyalkoxy)benzoic acid, wherein n is the number of carbon atoms in said alkylene group;

provid[e] said 4-(n-hydroxyalkoxy)benzoic acid as one or more of a phenylene ring selected from the group consisting of a first phenylene ring comprising a first carboxylic group and a second phenylene ring comprising a second carboxylic group.

The examiner therefore has not pointed to a teaching of every limitation of claim 149 in Seiberle, and certainly has not pointed to all a teaching of all of the limitations found in the claims depending from claim 149.

-Rejection over Schadt

The examiner rejected claims 105-141 as anticipated by U.S. Patent No. 6,144,428 to Schadt ("Schadt").

-Response

The examiner also has not established a case of *prima facie* anticipation of the pending claims over Schadt. The claims are directed to a method of making monomers. The examiner has not pointed to a teaching in Schadt of a method of making monomers. The examiner certainly has not pointed to a teaching of each and every method limitation of the claims in Schadt.

The examiner has not pointed to a teaching regarding how the monomers shown at the bottom of col. 4 of Schadt are made. The background of the invention in Schadt teaches as follows:

Anisotropic transparent or colored polymer network layers with the optical axis oriented in three dimensions, either uniformly or pre-set point by point, are of great importance in many branches of display technology, integrated optics, etc.

Substances having these properties in principle, that is certain cross-linkable liquid crystalline diacrylates and diepoxides, have been known for some years. These substances in monomer form (before cross-linking) can be oriented in cells by means of conventional orientation layers or under the action of external fields (such as magnetic or electric fields) in the LC phase and can be photo cross-linked in a second stage by conventional means (irradiation with non-polarized light) without losing the orientation impressed in the monomeric state.

Schadt, col. 1, ll. 16-30 (emphasis added). Applicant has not found a teaching in Schadt regarding how to make the monomers. In Example 2, the examiner merely states: "[t]he following diacrylate components were used as cross-linkable LC monomers in the examples." Schadt, col. 2, ll. 46-47.

The examiner has not pointed to a teaching or suggestion of each and every method limitation of the pending method claims in Schadt, for similar reasons to those discussed above with respect to Seiberle, and has not established a case of *prima facie* obviousness of the claimed method over Schadt.

Although the examiner did not issue a rejection over Schadt based on obviousness, the examiner also has not established that the claims are *prima facie* obvious over Schadt. The examiner has not pointed to a teaching in Schadt or in another cited reference of: (1) the suggestion of the claimed method of making monomers, or (2) the expectation of its success. *In re Vaeck*, 20 U.S.P.Q.2d at 1442.

Applicant respectfully requests that the rejection over Schadt be withdrawn.

-Rejection over Jolliffe

The examiner rejected claims 105-141 as anticipated by U.S. Patent No. 6,117,920 to Jolliffe, et al. ("Jolliffe").

Response

The examiner has not established a case of *prima facie* anticipation of claims 142-192 over Jolliffe. Jolliffe describes many different polymers. However, the only description of a **method** for making these polymers that Applicant has found in Jolliffe is the following:

The compounds (1) and (2) are prepared in analogy to the methods described in WO 93122397 and DE 195 04 224.

See Jolliffe, col. 23, ll. 43-44 and col. 25, l. 16-17. WO 93122397 and DE 195 04 224 appear to correspond to U.S. Patent No. 5,871,665 to Coates, et al. ("Coates").

Coates' examples refer the reactions illustrated in Diagrams 1-11, which span columns 45-64. The examiner has not pointed to a teaching or suggestion of every limitation of the pending claims in Diagrams 1-11 or elsewhere in Coates. See above discussion with respect to Seiberle.

The examiner has not pointed to each and every limitation of the claimed method in Jolliffe, or in another cited reference, and has not established a case of *prima facie* anticipation of the claims over Jolliffe.

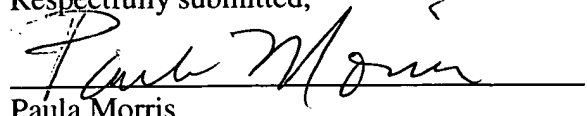
The examiner also has not established that the claims are *prima facie* obvious over Jolliffe. The examiner has not pointed to a teaching in Jolliffe or in another cited reference of: (1) the suggestion of the claimed method, or (2) the expectation of its success. *In re Vaeck*, 20 U.S.P.Q.2d at 1442. Nor has the examiner pointed to a teaching or suggestion in Jolliffe or another cited reference that it would be desirable to make the modifications that would be required to result in the claimed method. *In re Brouwer*, 37 U.S.P.Q.2d 1663, 1666 (Fed. Cir. 1995).

CONCLUSION

For the foregoing reasons, applicant respectfully requests entry of the amendments submitted herewith and consideration and allowance of the pending claims. The Commissioner is hereby authorized to charge any fees in connection with this

response, or to credit any overpayment, to Deposit Account No. 50-0997 (SwRI-2835-03)
maintained by Paula D. Morris & Associates, P.C.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Paula Morris", is written over a horizontal line.

Paula Morris

Reg. No. 31,516

Paula D. Morris & Associates, P.C.

10260 Westheimer, Suite 360

Houston, Texas 77042

(713) 334-5151

(713) 334-5157

ATTORNEY FOR APPLICANTS